



OTT's Office of Heavy Vehicle Technologies

Improving the fuel efficiency and alternative fuel capabilities of trucks and other heavy vehicles

ENERGY
EFFICIENCY AND
RENEWABLE
ENERGY

OFFICE OF
TRANSPORTATION
TECHNOLOGIES



Transportation FOR THE 21ST CENTURY

The Office of Heavy Vehicle Technologies (OHVT) was created in March 1996 to address public interest in the transportation energy aspects of customers who had been largely unrecognized. These customers are the manufacturers, suppliers, and users of heavy transport vehicles (trucks, buses, rail, inland marine, and off-highway vehicles). OHVT was created in recognition of the economic importance of heavy vehicles and awareness of the impact fuel supply disruptions have on those whose livelihood depends upon the transport of goods and services. The mission of OHVT is to conduct, in collaboration with industry partners and their suppliers, a customer-focused national program to research and develop technologies that will enable trucks and other heavy vehicles to be more energy efficient and able to use alternative fuels while reducing emissions. The OHVT heavy vehicle industry customers include truck and bus manufacturers, diesel engine manufacturers, fuel producers, suppliers to these industries, and the trucking industry.

Trucks – The Mainstay for Trade, Commerce, and Economic Growth

The nation's Gross Domestic Product (GDP), and hence, economic activity, is strongly related to freight transport. Trucks, rail, and inland marine transport are responsible for 99 percent of freight movement, with over 85 percent of the total value of goods in the U.S. being transported by trucks. Since the 1973 oil embargo, the increase in highway transportation fuel use has been largely due to trucks because of the growing economy and the increasing popularity of light trucks (pickups, vans, and sport utility vehicles) for personal transport. Within the transportation sector, energy use of trucks has been increasing at a faster rate than that of automobiles.

The OHVT Goals

The goals of the Heavy Vehicle Technologies Program are:

- Develop by 2004, the enabling technologies for Class 7 & 8 (large, on-highway) trucks to achieve a fuel efficiency of at least 10 mpg (at 65 mph) and meet emission standards prevailing in 2004, using petroleum-based diesel fuel.
- Develop by 2004, commercially viable Class 3-6 trucks (medium-duty trucks, such as delivery vans) that achieve, on an urban driving cycle, at least double the fuel economy of comparable current vehicles (1999), and as a research goal, reduce criteria pollutant emissions to at least 30 percent below EPA standards prevailing in 2004.
- Develop by 2004, the enabling technologies for clean diesel engines to be competitive with, and at least 35 percent more fuel efficient than, equivalent gasoline engines for light trucks, while meeting Federal and state emissions standards prevailing in 2004.

OHVT research and development (R&D) activities fall into three areas: Engine Technologies, Vehicle Systems Technologies, and Fuels and Lubrication Technologies.

Engine Technologies R&D

The diesel engine is the engine-of-choice for heavy-duty freight transport where efficiency, durability, reliability, and low speed power requirements are important. Heavy vehicles are virtually all diesel powered and by industry consensus, expected to remain so in the foreseeable future. As crafted with its customers, OHVT envisions the development of an energy efficient, very-low emissions diesel engine for all truck classes as a viable strategy for reducing the energy requirements of medium and heavy trucks for commercial transport services and the rapidly growing multipurpose (commercial and personal transport) light truck market. More energy efficient, clean diesel engines will enable the U.S. to reduce the rate of growth in transport-

Energy Efficiency and Renewable Energy's Office of Transportation Technologies (OTT) within the U.S. Department of Energy is charged with reducing America's dependence on petroleum, thereby bolstering the nation's energy security and improving the quality of its air. To meet that goal, OTT enters diverse, cost-shared R&D partnerships with like-minded organizations both public and private, helping develop technologies to a point where industry can commercialize them into marketable products. OTT is organized into four "sub" offices corresponding to major customer areas:

- *The Office of Advanced Automotive Technologies develops technologies that will lead to motor vehicles with greater fuel economy and lower emissions.*
- *The Office of Heavy Vehicle Technologies focuses on improving the efficiency of diesel engines for trucks, while simultaneously reducing emissions.*
- *The Office of Fuels Development is primarily working to reduce the cost of cleaner, domestically-sourced ethanol, a renewable and easy-to-use alternative fuel.*
- *The Office of Technology Utilization is working to pave the way for market acceptance of new transportation technologies through educational, voluntary, and other practical efforts in partnership with industry stakeholders, local, and state government.*

tation energy use without causing adverse economic impacts.

OHVT's central strategy focuses on emission control technologies and clean fuels for the diesel engine as its performance, efficiency, and non-petroleum fuel usage capabilities continue to be improved. Compared to 1970 vintage diesel engines, technology advances have already reduced engine out emissions of particulates by 95 percent and nitrogen oxides (NOx) by 70 percent, while the efficiency has increased by 42 percent. To meet more stringent future emissions standards, a three-pronged systems approach is utilized to arrive at the most cost-effective and workable emission control strategies for diesel engines for all types of trucks and other heavy vehicles.

1. Looking into the effects that fuel composition and properties have on engine performance and emissions.
2. Understanding the combustion process itself as it occurs in the engine to ascertain the effects on NOx and particulates coming out of the engine.
3. Applying innovative exhaust aftertreatment techniques to further clean up what comes out of the engine.

R&D efforts on clean diesel technologies are coordinated with the Office of Advanced Automotive Technologies through the Compression Ignition Direct Injection (CIDI)/Diesel Technologies Cross-cut Team.

Vehicle Systems Technologies R&D

Performance of the truck as an integrated system can be optimized and substantial overall energy efficiency improvement can be achieved through reduction of parasitic energy losses.

Efficiency increases can be achieved collectively through improved aerodynamics, improved rolling resistance, and reduced parasitic and accessory power requirements.

Fuels and Lubrication Technologies R&D

R&D efforts are divided into Advanced Petroleum-Based Fuels for heavy trucks and Alternative Fuels for medium and heavy trucks. The Advanced Petroleum-Based Fuels activity, coordinated with the Office of Advanced Automotive Technologies, focuses on development, testing, and evaluation of advanced petroleum-based fuels and blends including biomass, natural gas derived fuels, and oxygenates to enhance performance and emissions characteristics of diesel engines for light to heavy trucks. The Alternative Fuels activity is focused primarily on further development of promising natural gas engine technologies for medium and heavy trucks, to efficiencies comparable to conventional diesel counterparts.

Enabling Technologies

OHVT supports crosscutting, enabling technologies and scientific research that are critically important to meeting the program goals. These include the following:

- combustion technology,
- emission controls (including exhaust aftertreatment),
- materials,
- environmental science and health effects,
- truck safety, and
- engineering simulations and modeling.

To learn more about OTT's Office of Heavy Vehicle Technologies, visit our Web site at <http://www.trucks.doe.gov>.

For more information on how DOE is helping America remain competitive in the 21st century, please contact:

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